

**Title:** Porcine Epidemic Diarrhea (PED): Development of tests and reagents for diagnosis and disease management - **NPB #13-209**

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### **Scientific Abstract:**

Porcine epidemic diarrhea (PED) is a coronavirus-associated enteric disease of swine which has been well known in many parts of the world, particularly Europe and Asia since 1970's, although the disease has been absent from the US. The disease emerged in US swine unexpectedly in early 2013 and devastated the entire industry due to extremely high pre-weaning mortality and substantial productivity loss, not to mention rapid spreading through the entire country. More importantly it was a puzzle how the virus was entered the US, which still has not solved.

Although the pan-coronavirus PCR test with sequencing at Iowa State University Veterinary Diagnostic Laboratory (ISUVDL) allowed the initial identification of PED virus (PEDV) for the first time in the US, this test was considered inadequate for routine diagnostic testing since it was labor intensive test with low-throughput. Then, it became critical and urgent to develop an array of validated high-throughput tests for PEDV for use in diagnosis of disease outbreaks, epidemiological investigations, and control of PED. That was the objective of the study.

Coordinated efforts were made in a collective way on developing various diagnostic tools for PEDV such as virus isolation technique, nucleic acid-based assays (e.g., PCR, sequencing), tissue assays (e.g., immunohistochemistry), antibody assays (e.g., IFA, ELISA, VN) through literature review, collaboration with foreign scientists with appropriate expertise in PEDV and continuous monitoring of test performance once implemented. Necessary reagents were procured via importation or self-production. At a later stage of the study, all assays were re-validated once samples from pigs with known infection status (e.g., experimental animals) were available.

As a result, ISUVDL was able to offer a variety of laboratory tests fitting swine veterinarians and producers' needs (e.g., diagnosis, monitoring, surveillance, etc). At the same time, virus isolates and laboratory methods became valuable tools for research endeavor to understand the pathogenesis and control of PEDV.

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